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## Notes on the Genus *Morana* (Coleoptera, Pselaphidae)

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**Abstract** A new species of soil-living pselaphid beetle belonging to the genus *Morana*, one of the endemic genera in Japan, is described from Cape Ashizuri, southwestern part of Shikoku Island facing the Pacific Ocean. It is characterized mainly by very broad hind body, prominent second sexual characters, the chaetotaxy and the presence of copulatory piece differentiated into some spines. This species is described under the name *Morana elegans* together with a redescription of the known species.

### Introduction

The pselaphid beetles of the genus *Morana* are unique for its characteristic facies and peculiar distribution. The genus was proposed by SHARP in 1874 for the single new species *Morana discedens* taken at Nagasaki in Kyushu Island. The first discussion on the systematic position of the genus was made by KUBOTA in 1943, who considered that the genus should belong to the tribe Bythinini in view of its external morphology. In 1958, JEANNEL dealt with the genus and described its male genital organ. He concluded that the genus should be included in the tribe Tanypleurini and had a close affinity to the tropical genus *Bythinophanax*. The genus *Morana* can be regarded as one of the endemic pselaphid genera in Japan.

The author found an unknown species of *Morana* in litter materials taken in natural forests of the *Camellietea japonicae* area at several localities of Japan. It is described under the name *Morana elegans* with a redescription of the type species, *M. discedens*.

The abbreviations used in this articles are as follows: HW—greatest width of head (including eyes); PW—greatest width of pronotum; PL—length of pronotum, measured along the mid-line; PA—width of pronotal apex; PB—width of pronotal base; WA—width of elytral apex; EW—greatest width of elytra; EL—length of elytra, measured along suture; AAW—apical width of first abdominal tergite between lateral sulci; AW—greatest width of first abdominal tergite; + shows longitudinal arrangement of setae, — shows transverse arrangement of setae.

### Genus *Morana* SHARP

*Morana* SHARP, 1874, Trans. ent. Soc. London, 1874, p. 117; 1883, Trans. ent. Soc. London, 1883, p. 321. — KUBOTA, 1943, Trans. Kansai ent. Soc., 9, p. 6. — JEANNEL, 1958, Mém. Mus. Hist. nat. Paris, (A), 19, p. 72.

Type species: *Morana discedens* SHARP, 1874.

Small-sized, broad and convex; body surface polished and covered densely with long pubescence; colour yellowish brown to reddish brown.

Head subtriangular, wider than long, with frontal furrows divergent posteriad; vertexal area convex, sutural carina extending from cervicum to the level of anterior margin of eyes; two vertexal foveae near the base connected with each other by U-shaped frontal sulcus; each of antennal tubercles prominent and angulate at both ends, dilated above in male with sinuate margin and polished apex which is strongly curved downwards; frons depressed between antennal tubercles, frontal margin projecting into rectangular plate in male; clypeus roundly extending, bearing in male a plate-like process and a pair of carinae or tubercles; genae rounded, though obtusely angulate before neck constriction; eyes well developed, much larger in male than in female, sparsely with short setae between coarse facets; labrum strongly transverse with shallowly emarginate apical margin; antennae relatively short, with very large segments 1 and 2, whose combined length is equal to that of funicle, segment 1 robust, segment 2 slender and enlarged towards apex, segment 3 cordate, segment 4 to 8 short cylindrical and segment 8 somewhat larger, last three segments larger than each of funicle, forming a club, segment 10 strongly transverse, terminal segment the largest and subconical, with base convex in male.

Pronotum transverse subcordate with convex disc; sides smooth, strongly rounded in front and less rounded and sinuate to hind angles, which are small and bicarinate; apex almost straight with distinct rim, base arcuate; disc smooth and gently convex; ante-basal foveae large and deep; five basal foveoid depressions small, the median one the largest.

Elytra transverse semi-ovate with convex surface; shoulders convex, though effaced in female, prehumeral borders oblique; sides gently and widely arcuate, though more or less oblique near apices; apical margin feebly arcuate; disc gently convex, though more or less flattened at middle portion; each elytron with two basal foveae; sutural convexity broad, parallel-sided, though narrowed towards apex; fine carina present on lateral sides.

Abdomen short, with five tergites and six sternites; tergite 1 to 3 with slender lateral rim at each side; tergite 1 ample and transverse, more than three times as long as the second, with arcuate sides of disc, basal carinae connected with small foveae at the basal margin; terminal tergite small and U-shaped. Sternite 1 small and either reaching just or beyond the level of coxa; sternite 2 ample, nearly equal in size to tergite 1; sternite 3 bearing lateral foveoid depression anteriorly.

Legs short and stout; protibia thickened near middle and curved towards apex; mesotibia thickened in distal half; metatibia feebly arcuate and thickened in distal half; all tarsal segments 1 very small, segment 2 of pro- and mesotarsi strongly enlarged towards apex, terminal segment slender.

Male genital organ relatively large, ovate, depressed on the ventral side and lightly sclerotized; inner sac armed with one to several copulatory pieces, which are

either thinly spatulate or gutter-shaped, and lightly sclerotized teeth-patch surrounding the copulatory pieces; styles produced from apical orifice, connected with each other by ring-like arm, right one prolonged with very broad base bearing a pair of distinct short setae, left one shortly triangular.

Cephalic chaetotaxy as follows: labral setae situated on each side are classified into marginal, medial and inner seta-groups. Tergal chaetotaxy as follows: a pair of spindle-shaped sensillae, one long sensillum and spiniform sensillae on the terminal tergite in male. Chaetotaxy of foreleg as follows: large spoon-shaped sensillum situated in the middle of protibia in male; spiniform sensillum situated between claw and terminal segment of protarsus.

*Notes.* The chaetotaxial characters used in the present paper were investigated on the basis of six demes of *M. discedens* and three demes of *M. elegans* from the southern part of Kyushu through Shikoku to the northern part of Honshu. No geographic variation was found among them. Even if there is some irregularity, it can be detected as aberrancy because the setal arrangement is always asymmetrical in such a case.

Taking the previous records into account, the author has concluded that the genus *Morana* is distributed in Kyushu, Shikoku and Honshu Islands. On the other hand, the vertical distribution of the genus was reported by TANOKUCHI (1982) not to exceed 300 m above the sea level in western Japan. Thus, the distribution area of the genus *Morana* is in accordance with the *Camellietea japonicae* area, and the genus may have developed in connection with certain characteristic environment produced by the special vegetation.

### *Morana discedens* SHARP

(Figs. 1, 3-8)

*Morana discedens* SHARP, 1874, Trans. ent. Soc. London, 1874, p. 117; 1883, Trans. ent. Soc. London, 1883, p. 321.

*Morana discedens*: KUBOTA, 1943, Trans. Kansai ent. Soc., 9, p. 6; JEANNEL, 1958, Mém. Mus. Hist. nat. Paris, (A), 18, p. 72; TANOKUCHI, 1979, Niigata-ken no Konchû, p. 72.

Length: male 1.1-1.2 mm, female 1.0-1.1 mm (from apical margin of clypeus to apex of last abdominal tergite), greatest width 0.49 mm.

Very small species of thickset body form with large forebody and stout appendages; frons, antennae and base of pronotum granulate. Colour light reddish brown and polished, ventral surface usually a little lighter than dorsum; apical segments of antennae, maxillary palpi and legs yellowish brown.

Head relatively large, subtriangular, evidently longer than wide, and convex above, with frontal furrows deep and fairly divergent towards base; vertexal area gently convex; genae always slightly shorter than eyes, oblique though arcuate, each with an obtuse angulation posteriorly; eyes large, two-thirds as long as genae, though smaller in female than in male; each of antennal tubercles conspicuous and

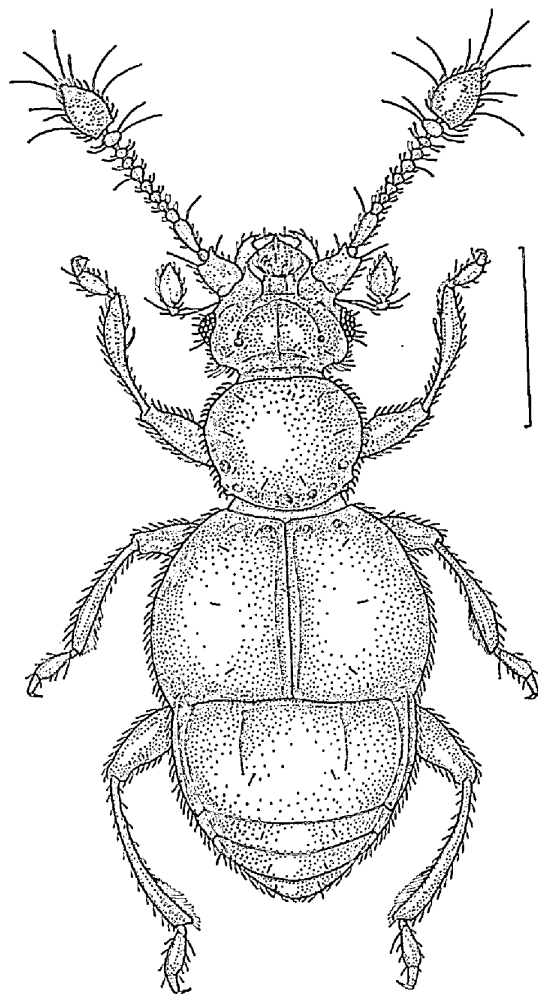


Fig. 1. *Morana discedens* SHARP, male, from Mt. Iwaya-san. Scale: 0.3 mm.

gently convex, emarginate margin in male sinuate between apex and posterior angulation; frons strongly depressed in male with a rectangular protuberance, which extends to the middle of antennal tubercles, but gently depressed in female; clypeus armed with porrect small horn, median longitudinal carina and a pair of carinae on either side in male; labrum strongly divergent towards apex, which is feebly arcuate; antennae short and stout, reaching the base of elytra, submoniliform except for segments 1, 2 and terminal; segment 1 gently dilated towards apex, in male, grooved at middle ventrad with base and apex produced; segment 2 cylindrical with slightly enlarged apex and three-fourths as long as segment 1; segments 9 and 10 slightly transverse, segment 9, 3:4, segment 10, 2:3; terminal segment slightly expanded at the base in male.

Pronotum transverse subcordate, slightly narrower than head and widest at about two-thirds from base, and more strongly contracted towards apex than towards base; HW/PW 1.02–1.03, PW/PL 1.10–1.11, PW/PA 1.38–1.39, PW/PB 1.21–1.22; surface gently convex and smooth; sides hardly oblique at anterior rim,

strongly arcuate in front, less so behind middle, and briefly but distinctly so just before hind angles which are very small, bi-carinate and produced posterolaterally; apex evidently narrower than base, PB/PA 1.13–1.14, either gently arcuate or almost straight with feeble emargination at middle, anterior rim broad and obviously distinguished from disc; base arcuate and granulate, more or less distinctly emarginate on each side just inside hind angle; disc convex but simple.

Elytra short, transverse semi-ovate and convex, much wider than pronotum, widest at about middle and slightly dilated towards apices; EW/PW 1.53–1.54, EW/EL 1.21–1.22, EB/EA 1.50; surface gently convex though more or less compressed at middle portion; shoulders convex though very obtuse, effaced in female; prehumeral borders shortly straight and oblique; sides gently and widely arcuate throughout but more or less rounded at apices; base shallowly emarginate, frontal angles effaced; median longitudinal convexity nearly parallel-sided and narrowed apically; basal foveae large and shallow.

Abdomen semi-ovate, short and broad, evidently narrower than elytra, with surface gently convex on disc and segments 1–3 with broad lateral rims; tergite 1 ample and transverse (3: 5) with sides arcuate, lateral sulci widely arcuate, but more or less strongly so near base and less near apex, a pair of basal carinae long, extending to about three-fifths from base, their bases being separated by five-ninths the width of tergite; EW/AW 1.15, AAW/EA 1.38; tergite 5 very small and U-shaped.

Male genital organ lightly sclerotized. Aedeagus about five-elevenths as long as elytra, ovoid, slightly depressed on the ventral side. Inner sac armed with a very large copulatory piece, a long compact mat of poorly sclerotized spines and a small copulatory piece; larger copulatory piece almost a half as long as aedeagus and lying near apical orifice, gutter-shaped as a whole with broad base, gradually narrowed towards sharpened apex with a large oval hole at about distal third; smaller copulatory piece spatulate and twisted, embraced by the teeth-mat. Right style slender and more or less gutter-shaped, thickened from the base to near the middle, and gradually tapering towards sharpened apex, with broad basal process bearing a pair of short setae; left style subtriangular, being very broad at the base and more or less curving outside apically.

Chaetotaxy as follows: frontal margin with a pair of sensillae which are gradually dilated towards apices and somewhat spatulate at about middle and two pairs of spindle-shaped sensillae beneath the long ones; marginal seta-group on labrum composed of two primary setae, one secondary long seta and two short setae (s.+p.l.+p.l.+s.l.+s.), median seta-group composed of one primary long seta and three short setae (s.—p.l.—s.+s.), inner seta-group composed of one primary long seta, two secondary setae and two short setae (s.+s.l.—p.l.—s.+s.l.), labral setae usually fourteen in number; terminal tergite in male armed with one long sensillum with truncate apex, a pair of spindle-shaped sensillae and a few relatively large spiniform setae.

*Type depository.* Department of Entomology, British Museum (Natural History), London.

*Species examined.* 4 ♂♂, 3 ♀♀, Mt. Iwaya-san, Nagasaki City, Nagasaki Pref., Kyushu Is., 7-I-1981, T. UEMOTO leg.; 2 ♂♂, 3 ♀♀, Wari-ishihara, 100 m alt., Nagasaki Pref., Kyushu Is., 12-V-1981, Y. TANOKUCHI leg.; 2 ♀♀, Honmyō-ji Temple, 50 m alt., Kumamoto City, Kumamoto Pref., Kyushu Is., 8-V-1981, Y. TANOKUCHI leg.; 3 ♂♂, 2 ♀♀, Kashiwa-jima Is., Kōchi Pref., 30-V-1978, Y. TANOKUCHI leg.; 2 ♀♀, Seiryū-ji Temple, Tosa City, Kōchi Pref., Shikoku Is., 18-X-1980, Y. TANOKUCHI leg.; 1 ♂, 1 ♀, Kifune, Kyoto City, Kyoto Pref., Honshu Is., 6-VIII-1980, Y. TANOKUCHI leg.; 1 ♂, Sakurai, Mishima-gun, Osaka Pref., Honshu Is., 12-VIII-1980, Y. NISHIKAWA leg.; 2 ♂♂, Mt. Kasuga-yama Nara City, Nara Pref., Honshu Is., 19-V-1980, Y. TANOKUCHI leg.; 3 ♂♂, 1 ♀, Atsugi, Kanagawa Pref., Honshu Is., 11-X-1977, Y. TANOKUCHI leg.; 1 ♂, Johga-shima Is., Kanagawa Pref., 1-XI-1979, M. SAKAI leg.; 2 ♂♂, Hatogaya, Edo-chō, Ibaraki Pref., Honshu Is., 19-V-1981, H. KOBARI leg.; 3 ♂♂, Natachi, 2-X-1964, 2 ♂♂, 13 ♀♀, Noo, 2-X-1964, 1 ♂, Yuzawa Spa, 1-X-1962, 14 ♂♂, 12 ♀♀, Nogata, 23-IX-1964, 1 ♂, Kurokawa, 20-X-1965, 1 ♂, 1 ♀, Iwagasaki, 2-XI-1964, Niigata Pref., Honshu Is., K. BABA leg.

*Distribution.* Japan (Honshu, Shikoku and Kyushu).

*Notes.* This species seems more primitive in morphological characters than the following species. Its body form is relatively parallel-sided, mainly due to the large fore body not so contracted as in the following species and to the peculiarly narrow hind body caused by relatively narrow abdomen. Its sexual characters and chaetotaxy are not well developed as in the latter species. Its aedeagus is small and primitive in structure, the copulatory piece are not differentiated, and the styles are not well developed.

This species is abundant under dead leaves in secondary forests, coppices, forest margins, forests with bamboo grasses and natural forests growing on somewhat dry conditions such as *Castanopsis*-forest, *Quercus*-forest and *Abies*-forest. In all cases, above habitats have been relevant to somewhat dry condition. *M. discedens* seems to choose more or less dry condition in the *Camellietea japonicae* area. It seems to be a derivative species which was specialized by direct adaptation to relatively dry condition. It does not show any geographical variation in the external morphology. It is probable that the species is more strongly related to habitats than to localities. The vegetation in the *Camellietea japonicae* area has been changed by human impact to substitutional vegetation in the most parts of Japan. This seems to have been favourable to *M. discedens*. Perhaps this is the reason why the species is widespread in Japan so far as the vegetational condition is suitable for its existence.

*Morana elegans* TANOKUCHI, sp. nov.

(Figs. 2, 9-14)

Externally similar to the preceding species, differing from it in slightly larger body size, somewhat darker coloration, longer and denser pubescence, broad hind-body, and some other minor details. This new species is, however, markedly different from *M. discedens* in the secondary sexual characters, in the structure of male genitalia and in the chaetotaxy.

Length: male 1.2-1.3 mm, female 1.3 mm (from apical margin of clypeus to apex of last abdominal tergite), greatest width 0.53 mm.

Head as in *M. discedens*, but the vertexal area is more convex with finer sutural carina; genae almost as long as eyes, feebly arcuate and oblique before each of posterior angles, which are more or less sharpened; frontal furrows strongly di-

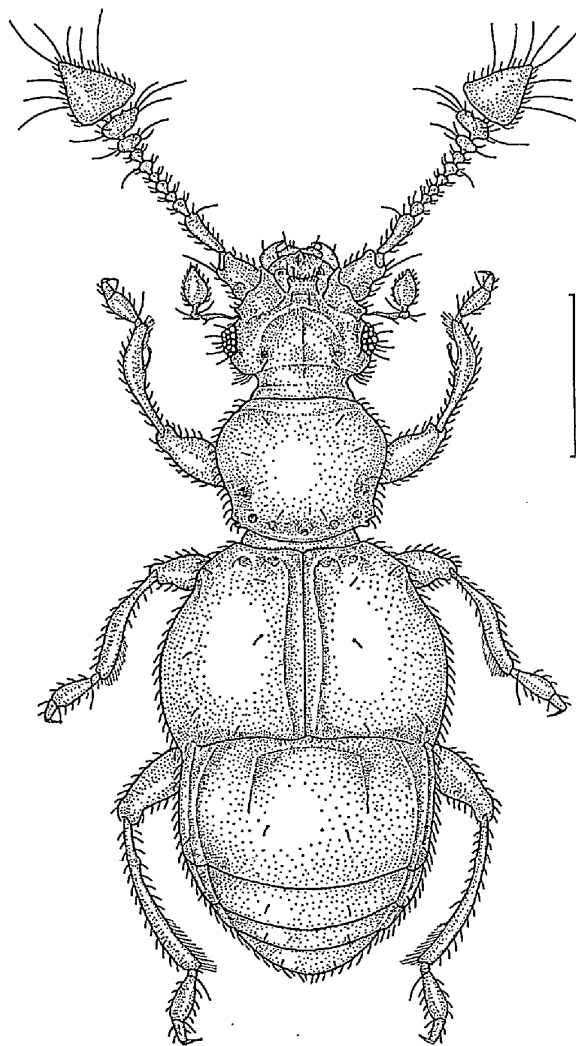


Fig. 2. *Morana elegans* TANOKUCHI, sp. nov., male, from Cape Ashizuri. Scale: 0.3 mm.

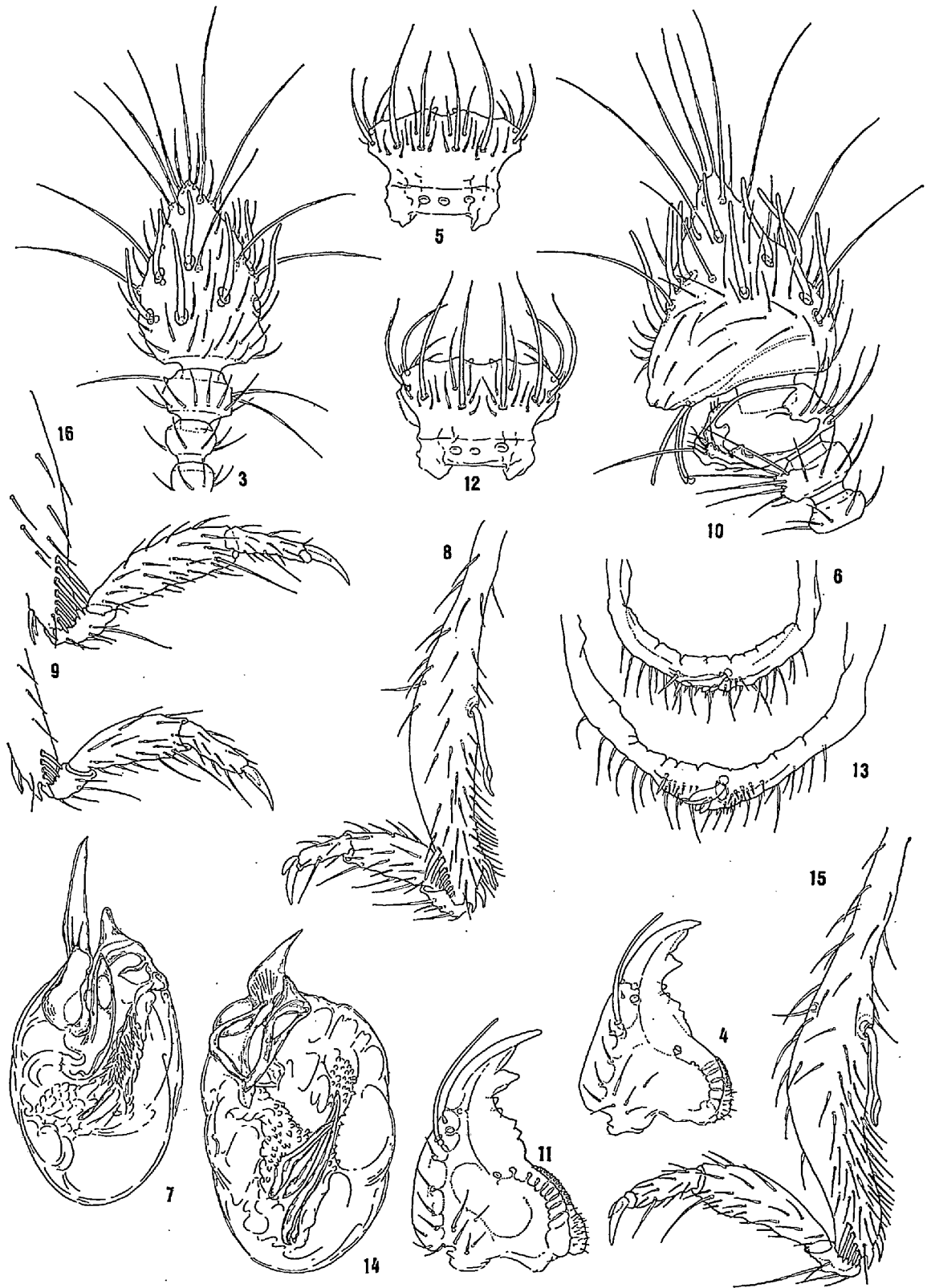
vergent; antennal tubercles fairly convex especially at middle in male, each margin shallowly emarginate but sinuate between posterior angle and prolonged apex; frons similar to that in *M. discedens*, but the protuberance in male extends to the level of apical fourth of antennal tubercle; clypeus rounded with margin obtusely dentate, though more or less sharpened in male, and armed with small tubercles apically and obtuse denticles on each side; antennae short and stout but slightly longer than in *M. discedens*, either reaching basal fourth of elytra or extending beyond that level in male; scape slightly dilated towards apex with strongly convex base and shallow preapical groove in male; segment 2 enlarged apically with arcuate basal half and as long as scape; segments 9 and 10 strongly transverse in male, the former fully twice as wide as its length, the latter 3:5 in female and segment 10 deeply grooved in male; terminal segment either as long as or slightly longer than segment 1, bell-shaped and about as wide as long in male.

Pronotum similar to that of *M. discedens*, with the exception of more strongly arcuate sides in front, narrower anterior rim, much convex disc and gently arcuate base; PW/HW 1.00, PW/PL 1.20, PW/PA 1.55–1.56, PW/PB 1.30–1.31, PB/PA 1.18–1.19. Elytra transverse semi-ovate, broader than those of *M. discedens*, widest at a level between the middle and apical fourth; EW/PW 1.51–1.52, EW/EL 1.28, EA/EB 1.46–1.47; shoulders distinct, less convex than those of *M. discedens*, with prehumeral borders oblique and feebly arcuate; sides either oblique or very slightly emarginate behind shoulders, and then gently arcuate to apices though more or less oblique apically; surface gently convex but disc more or less flattened throughout; sutural convexity broader than that of *M. discedens*. Abdomen as in *M. discedens*, but broader in size and slightly narrower than elytra; first tergite ample and fully twice as wide as long with sides either almost straight or feebly arcuate, lateral sulci gently and widely arcuate though more or less oblique apically, basal carinae short, extending to the mid-distance along the length of the tergite, its bases being separated by about three-fifths the width of first tergite; EW/EA 1.07–1.08, AAW/WA 1.60–1.61; fifth tergite very small, slender and U-shaped. Legs very similar to those of *M. discedens*, but somewhat shorter and inflated; protibia strongly arcuate and thickened in the middle.

Male genital organ basically similar to that of *M. discedens* but considerably different in details from the latter. Aedeagus larger and about two-thirds as long as elytra. Inner sac armed with three gutter-like or spatulate copulatory pieces and coarse mat of poorly sclerotized teeth or scales which surround copulatory pieces; each copulatory piece elongate, about a half as long as aedeagus, thin and lying near base, the shortest and shorter ones being slender and dilated apically, the

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Figs. 3–16. *Morana* spp.; 3, 10, club of antenna in male; 4–5, 11–12, mouth parts in dorsal aspects; mandible (4, 11), labrum (5, 12); 6, 13, terminal tergite in male (hidden side, dorsal aspects); 7, 14, male genitalia in dorsal aspects; 8, 15, fore leg in male; 9, 16, mid leg. — 3–9. *Morana discedens* SHARP, from Mt. Iwaya-san of Nagasaki City.  
— 10–16. *Morana elegans* TANOKUCHI, sp. nov., from Cape Ashizuri.



longest one spatulate and gradually divergent towards apex which is divided into two parts with sharpened and reflexed tips. Styles small but broad and laminate; right style large, basal half semicircular, distal half strongly dilated with curving and rapidly pointed apex and slender process extending from the middle bearing a pair of short setae apically; left one triangular, abruptly narrowed apically and curving inside, with prolonged appendages at both sides.

Chaetotaxy as follows: frontal margin with a pair of bundles of setae at middle in male; marginal and middle seta-groups on labrum quite the same as in *M. discedens*, inner seta-group composed of primary one long seta, secondary long seta and four short setae (s.+s.l.—p.l.—s.+s.+s.), labral setae usually fifteen in number; terminal tergite bearing one long sensillum at middle which is attenuated with arcuate apical half, a pair of spindle-shaped sensillae behind large sensillum and short spiniform setae at the lateral sides in male.

*Type series.* Holotype: ♂, Kongôfuku-ji Temple, 100 m alt., 19-V-1978, Y. TANOKUCHI leg. Allotype: ♀, Kongôfuku-ji Temple, 100 m alt., 29-V-1978, Y. TANOKUCHI leg. Paratypes: 10 ♂♂, 24 ♀♀, Kongôfuku-ji Temple, 100 m alt., (Uwa-3), 29-V-1978, 1 ♂, Mt. Shirao, 220 m alt., (Uwa-1), 4-VIII-1980, Cape Ashizuri, Kôchi Pref., Shikoku Is., Y. TANOKUCHI leg.; 11 ♂♂, 20 ♀♀, Cape Manazuru, Kanagawa Pref., 12-V-1983, H. KUBOTA leg.; 1 ♂, Mt. Takao, Hachijôji City, Tokyo Pref., 5-VII-1976, Y. TANOKUCHI leg.; 1 ♂, Goh-dai, Chiba Pref., Bôshô Peninsula, 22-VI-1980, Y. TANOKUCHI leg.

The holotype will be preserved in the collection of the National Science Museum (Nat. Hist.), Tokyo; the allotype and the paratypes are preserved in the author's cabinet.

*Notes.* The present and the preceding species have many morphological characters in common. It is doubtless that a close relationship exists between them. This new species is, however, more advanced than *M. discedens* in the main structure of male genitalia; the aedeagus has already become modified, the copulatory pieces are differentiated, and the styles are more heavily sclerotized with appendages. A similar advanced state is also detected in the increase of the number and the diversity of the shape of setae.

The type series of this new species was taken from under moist dead leaves belonging to the humus zone or surface soil. All the localities of the materials obtained lie in natural forests such as *Machilus*-forest and *Zelkova*-forest or along mountain streams in the *Camellietea japonicae* area. They are situated on the Pacific side of Japan. The new species inhabiting dark forest floor may have smaller resistance to dry condition than the preceding species. It seems to live in relation to stable moisture.

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